DNA sampling key to noninvasive study of mountain lions in southwestern parks

by Elaine F. Leslie

MOUNTAIN LION SIGHTINGS AND ATTACKS ARE commonly reported throughout the National Park System. Knowing how and when these large carnivores use park habitat, especially areas frequented by humans, is key to reducing potentially dangerous interactions with humans and facilitates this species' protection.

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A multiyear study is providing a framework for national parks in the Southwest to obtain information about mountain lions with minimal disruption to their natural behavior. Resource managers from Grand Canyon, Mesa Verde, Saguaro, Guadalupe Mountains, Carlsbad Caverns, and Zion National Parks and several national monuments near Flagstaff joined forces in 2002 in a multipark effort to collect DNA samples from mountain lions. Analyzed in the laboratory, the DNA identifies individuals and allows scientists to determine kinship and estimate population sizes. Before 2001 these parks had information on the presence of mountain lions, but little was known about how they used park habitat.

The parks are conducting DNA and food source studies of the reclusive species through the noninvasive collection of hair, skin, and feces. Trained staff and volunteers attach to trees small pads of carpet studded with nails and laced with scent. Attracted to these lures, mountain lions rub on the pad, leaving behind hair samples, or deposit feces, which often contain skin cells. Technicians collect the samples every two weeks and send them out for analysis. The animals' DNA fingerprint and food sources can thus be determined without direct human contact. Additional information comes from specialized cameras at some locations that catch mountain lions in the act of depositing their DNA. Investigators are therefore able to match the resulting photographs to mountain lion tracks and the DNA signatures, establish kinship, and map home ranges of the animals. The work is funded by the National Park Foundation, the Grand Canyon National Park Foundation, and the Colorado Plateau Cooperative Ecosystem Studies Unit.

Data collected since 2000 in Grand Canyon suggest that 7 adult mountain lions incorporate areas of high human activity, including the South and North Rim developed areas, into their home ranges. Another 19 mountain lions disperse or move through these areas seeking to establish home range. The majority of adult mountain lions using Guadalupe Mountains National Park disperse to nearby Carlsbad Caverns, according to early data analysis. At Mesa Verde, half of the 12 individuals identified in the first year of the study use the park as home range. (Data collection dropped off significantly following two years of intense fires and resulting habitat loss.) The Flagstaff area units of Walnut Canyon, Sunset Crater, and Wupatki National Monuments have identified one mountain lion from DNA samples.

This information has already led to changes at Grand Canyon. The park is developing a management plan that addresses visitor safety and mountain lion protection, outlining, for example, when area closures are warranted and standard procedures to follow in the event of an attack. To increase safety, park staff closely monitor or move the carcasses of animals killed by mountain lions and cached near campsites, residential areas, and trails. The park has also thinned vegetation along a path leading to a school in the park to make the area less appealing to mountain lions, and has stepped up its information campaign for visitors and residents alike.

This multipark study has added to knowledge of a large carnivore and demonstrated an effective model for increasing communication and collaboration among parks. Results will be compiled and loaded onto each park's Geographic Information Systems database. A brochure on mountain lion ecology and human safety has also been developed and is being distributed in the parks. Finally, in addition to developing management plans and standard operating procedures, the parks are planning for long-term monitoring of mountain lions beyond 2003 when the study ends. Grand Canyon National Park is also planning to evaluate the cost and efficacy of the noninvasive DNA sampling technique compared with traditional methods. To make this comparison, the park has received funding to draw blood from and radio-collar several mountain lions in 2003 and 2004 identified through the noninvasive techniques. ■

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